AIR EMISSION SOURCE
CONSTRUCTION PERMIT

Source ID No.:	1490001
Effective Date:	August 9, 2005
Source Name:	Westar Energy, Inc. - Jeffrey Energy Center
NAICS:	221112, Fossil fuel power generation
Site Location:	25905 Jeffrey Road St. Mary's, Kansas 66536
Site Owner/Operator Name:	Westar Energy, Inc.
Site Owner's/Operator's Mailing Address:	818 South Kansas Avenue Topeka, Kansas 66612
Contact Person for Site Owner/ Operator:	Mr. Daniel R. Wilkus, P.E. – Manager, Air Programs Telephone Number (785) 575-1614

This permit is issued pursuant to K.S.A. 65-3008 as amended.

Description of Activity Subject to Air Pollution Control Regulations

Westar Energy, Inc. (Westar) is proposing to initiate a NO_x Reduction Project on Unit 3 (JEC3) at the Jeffrey Energy Center. The project will include the addition of low-NO_x burners, separated overfire air (SOFA), and changes to the pulverizers to improve consistency of coal fineness to allow proper operation of the low-NO_x burners. This project will result in a decrease in nitrogen oxide (NO_x) emissions and an increase in carbon monoxide (CO) emissions.

The proposed modification will be subject to the requirements of 40 CFR 52.21, Prevention of Significant Deterioration (PSD) as adopted under K.A.R. 28-19-350 as a result of being a major modification of a major stationary source for at least one regulated pollutant emitted in excess of the PSD significant emission levels. JEC3 is an affected source subject to Title IV of the Federal Clean Air Act, Acid Deposition Control. The proposed project does not constitute a modification or reconstruction for the purpose of determining applicability of New Source Performance Standard (NSPS) requirements.

Emissions of oxides of nitrogen (NO_x) and carbon monoxide (CO) were evaluated for this permit review. This project is subject to the provision of K.A.R. 28-19-300 (Construction permits and approvals; applicability) because the potential-to-emit of CO exceeds 100 tons per year.

An air dispersion modeling impact analysis, an additional impact analysis, and a Best Available Control Technology (BACT) determination were conducted as a part of the construction permit application process.

Significant Applicable Air Pollution Control Regulations

The following significant Kansas air quality regulations were determined to be applicable to this project:

K.A.R. 28-19-300 Construction permits and approvals; applicability

Air Emission Unit Technical Specifications

The following equipment or equivalent is approved:

1. Installation of low-NO_x burners.
2. Addition of separated overfire air (SOFA) capability
3. Modification of existing pulverizers

Air Emissions Estimates from the Proposed Activity

Pollutant Type	Net Change in Emissions (Tons per Year)
Nitrogen Oxides (NOx)	-7,090
Carbon Monoxide (CO)	5,702[1]

1. Emission estimates are based on new emission limit.

Air Emission Limitations

1. Coal-fired Boiler:

    a. Emissions of carbon monoxide (CO) shall not exceed 300 parts per million by volume, corrected to 3% O_2, averaged over the period specified in the test protocol approved by KDHE, excluding periods of startup, shutdown, and malfunction.

Performance Testing and Compliance

1. Within 180 days after initial start-up of the NO_x Reduction Project, the owner or operator shall conduct performance tests to demonstrate compliance with the applicable conditions and limitations set forth in this permit for CO (as defined above) and furnish KDHE a written report of the results of such performance tests.

2. Compliance with the CO emission limit shall be demonstrated at steady state operation and base load.

Monitoring, Recordkeeping and Reporting

1. Compliance with the CO BACT limit will be demonstrated through performance testing as provided above, no additional monitoring, recordkeeping or reporting (except for the submittal of the performance test report) is required.

Notification

1. KDHE shall be notified of the date on which performance testing is to commence. This notification is to be postmarked no less than 30 days prior to such date.

General Provisions

1. This document shall become void if installation of the NO_x Reduction Project has not commenced within 18 months of the effective date of this permit, or if installation is interrupted for a period of 18 months or longer.

2. A construction permit or approval must be issued by KDHE prior to commencing any construction or modification of equipment or processes which result in an increase in potential-to-emit equal to or greater than the thresholds specified at K.A.R. 28-19-300.

3. Upon presentation of credentials and other documents as may be required by law, the permittee shall allow a representative of the KDHE (including authorized contractors of the KDHE) to:

   (a) enter upon the permittee's premises where a regulated facility or activity is located or conducted or where records must be kept under conditions of this document;

   (b) have access to and copy, at reasonable times, any records that must be kept under conditions of this document;

   (c) inspect at reasonable times, any facilities, equipment (including monitoring and control equipment), practices or operations regulated or required under this document; and

(d) sample or monitor, at reasonable times, for the purposes of assuring compliance with this document or as otherwise authorized by the Secretary of the KDHE, any substances or parameters at any location.

4. The emission unit or stationary source which is the subject of this document shall be operated in compliance with all applicable requirements of the Kansas Air Quality Act and the Federal Clean Air Act.

5. This document does not relieve the permittee of the obligation to obtain other approvals, permits, licenses or documents of sanction which may be required by other federal, state or local government agencies.

6. Issuance of this document does not relieve the owner or operator of any requirement to obtain an air quality operating permit under any applicable provision of K.A.R. 28-19-500.

Permit Engineer

_____ _____

Rick Bolfing, P.E. Date Signed
Environmental Engineer
Bureau of Air and Radiation
Air Permitting Section

RJB:
c: C-6420
NEDO

PREVENTION OF SIGNIFICANT DETERIORATION (PSD)

PERMIT SUMMARY SHEET

Permit No.: 1490001

Source Name: Jeffrey Energy Center-Westar Energy, Inc.

Source Location: 25905 Jeffrey Road, St. Mary's, KS 66536

Area Designation:

K.A.R. 28-19-350, Prevention of significant deterioration of air quality, affects new major sources and major modifications to major sources in areas designated as "attainment" or "unclassifiable" under section 107 of the Clean Air Act (CAA) for any criteria pollutant. The State of Kansas is classified as attainment for the National Ambient Air Quality Standards (NAAQS) for all the criteria pollutants.

The St. Mary's area in Pottawatomie county, Kansas, where this modification is taking place, is in attainment for all the criteria pollutants.

Project description:

The Jeffrey Energy Center "JEC" is located in St. Mary's, Pottawatomie County, Kansas. The JEC plans to modify the Unit 3 by installing low NOx burners, separated overfire air (SOFA), and changes to the pulverizers to improve consistency.

Significant Applicable Air Emission Regulations

This source is subject to Kansas Administrative Regulations relating to air pollution control. The application for this permit was reviewed and will be evaluated for compliance with the following applicable regulations:

1. K.A.R. 28-19-300. Construction Permits and Approvals. Requires "Any person who proposes to construct or modify a stationary source or emissions unit shall obtain a construction permit before commencing such construction or modification."

2. K.A.R. 28-19-350 Prevention of significant deterioration of air quality. "The provisions of K.A.R. 28-19-350 shall apply to the construction of major stationary sources and major modifications of major stationary sources in the areas of the state designated as an attainment area or an unclassified area for any pollutant under the procedures prescribed by section 107(d) of the federal clean air act (42 U.S.C. 7407 (d))."

Air Emissions from the Project:

The potential-to-emit of one of the PSD regulated pollutants from the existing Jeffrey Energy Center exceeds 100 tons per year. Hence, Jeffrey Energy Center is considered to be a major stationary source under provisions of K.A.R. 28-19-350.

The potential-to-emit from the proposed modification, i.e. from the NOx Reduction Project, are listed in Table 1-1 of Section 1 and detailed out in Appendix D Table D-1 of the application. Proposed potential-to-emit of NOx and CO were compared with the Significant Emission Rates for PSD applicability for the criteria and non-criteria pollutants. The increase in potential-to-emit is above the PSD significance level for CO and will be reviewed under the PSD regulations. NOx emissions were greatly reduced under this modification.

The proposed NOx Reduction Project is described in Section 2 of the application. The uncontrolled potential-to-emit used for BACT analysis of the project uses Alstom's (manufacturer's) calculations for a total of less than 300 ppm at 3% oxygen, which equates to approximately 0.25 lb/mmBtu for CO emissions increase after the modification. The manufacturer has guaranteed the project will reduce NOx emissions from 0.40 lb/mmBtu (2004 recorded data) to 0.15 lb/mmBtu or less. These values are shown in Appendix D, Table D-1 of the application.

Hence, this project will be a major modification of an existing major stationary source resulting in a net significant increase of CO. This project will be subject to the various aspects of K.A.R. 28-19-350 such as the use of best available control technology, ambient air quality analysis, and additional impacts upon soils, vegetation and visibility.

Best Available Control Technology (BACT)

BACT requirement applies to each new or modified affected emissions unit and pollutant emitting activity. Also, individual BACT determinations are performed for each pollutant emitted from the same emission unit. Consequently, the BACT determination must separately address, for each regulated pollutant with a significant emissions increase at the source, air pollution controls for each emissions unit or pollutant emitting activity subject to review. Westar Energy was required to prepare a BACT analysis for KDHE's review according to the process described in Attachment A. KDHE's evaluation of the BACT for the proposed NOx Reduction Project's analysis is presented in Attachment B.

In short KDHE has concurred with the Westar Energy for the following:

BACT for Carbon monoxide is 300 ppm at 3% O_2 at baseload

Ambient Air Impact Analysis

The owner or operator of a proposed source or modification must demonstrate that allowable emission increases from the proposed modification, in conjunction with all other applicable emissions increases or reductions, would not cause or contribute to air pollution in violation of:

1) any national ambient air quality standard in any air quality control region; or
2) any applicable maximum allowable increase over the baseline concentration in any area.

Westar Energy used EPA approved dispersion modeling guidelines (incorporated as Appendix W of 40 CFR 51) to predict the ambient air impacts. A work-plan for the Jeffrey Energy Center NOx Reduction Project Ambient Air Quality Impact Analysis was submitted to KDHE on April 27, 2005.

The ISCST3 model was used to determine the maximum predicted ground-level concentration for each pollutant and applicable averaging period resulting from various operating loads. Conservative pollutant emission rates were selected from manufacturer's data contained in Table 6-3 of the application to produce worst case dispersion conditions and highest model predicted concentrations (i.e. lowest exhaust temperature and exit velocity and, the highest emission rate). Table 6-3 of the application shows the JEC Unit 3 stack parameters used in the Ambient Air Quality Impact Analysis. The most recent five (5) years of meteorological data available for ISCST 1987 to1991 of surface and upper air was used in the modeling. See Table 6-4 and Table E-1 of Appendix E of the application where the predicted model concentrations for each pollutant for the applicable averaging period is compared with the PSD Class II (the whole State of Kansas is designated as a Class II area) significant impact levels. Concentrations were below the modeling significance levels for all averaging periods.

Increment consumption analysis was not required since there is no PSD increment level for CO.

Additional Impact Analysis:

Visibility Impairment Analysis

Westar Energy was required to provide an analysis of the impairment to visibility, and impacts on plants, soils and, vegetation that would occur as a result of this project and to what extent the emissions from the proposed modification impacts the general commercial, residential, industrial and other growth.

Westar Energy conducted a visibility degradation analysis for the NOx emissions from the proposed modification. Westar Energy used the document "Workbook for Plume Visual Impact Screening and Analysis", EPA 450/4-88-015, September 1988, and

the EPA approved dispersion modeling procedure "VISCREEN" for guidance. A visibility analysis is performed for Class I (visibility-sensitive) areas located within 100 kilometers of a proposed facility. There are no Class I areas in Kansas. The nearest PSD Class I area is Hercules Glades which is located approximately 408 kilometers east-southeast of the JEC. In accordance with KDHE guidance memorandum dated July, 15, 1990, a visibility impairment analysis was conducted at the nearest sensitive area, Shawnee County State Park located approximately 16.8 kilometers to the east of the plant and Tuttle Creek State Park located approximately 40.6 kilometers to the west.

A Level 1 VISCREEN visibility impairment analysis was performed for the Shawnee County State Park and Tuttle Creek State Park. The composite worst case hourly emission rate over all modes of operation for NOx from the NOx Reduction Project were input into the model, along with the most conservative meteorological conditions. The results are shown in Table 7-2 for Shawnee County State Park and Table 7-3 for Tuttle Creek State Park of the application. Shawnee County State Park's and Tuttle Creek State Park's visibility both inside of the park and outside of the park was improved. According to the guidance memorandum a Level-2 visibility impairment screening analysis was not required.

Impacts on Vegetation, Soils and Animals

In accordance with the guidance memorandum, an impact analysis on plants, soils, and animals is required for pollutants exceeding the PSD significance levels. The document EPA 450/2-81-078 "A Screening Procedure for the Impacts of Air Pollution Sources on Plants, Soils and Animals" contains information about the effects the increased CO and associated decrease NO_2 (pollutant of concern) emissions would have on such receptors.

The effects of CO on vegetation have undergone only brief laboratory study, thus, its effects on vegetation are somewhat uncertain. Some research indicates that CO exposure may cause the production of internal ethylene in plant tissue at concentrations of greater than 100 ppm. Since the secondary ambient standards for the 1-hour and 8-hour averaging periods, 46 ppm (46,000 µg/m3) and 20 ppm (20,000 µg/m3) respectively, will not be exceeded by the project, this project should have negligible impacts on nearby soils and vegetation.

Growth In Commercial, Residential and Industrial activity

This modification at JEC plant will stimulate an increase in the local labor force during the construction phase in the St. Mary's, but the increase will be temporary, short lived, and will not result in permanent/significant commercial and residential growth occurring in the vicinity of the JEC. No new permanent jobs will be created as a result of this modification. Therefore, no growth impacts on commercial, residential or industrial aspects will result.

Attachment A
KEY STEPS IN THE "TOP-DOWN" BACT ANALYSIS

STEP 1: **IDENTIFY ALL POTENTIAL AVAILABLE CONTROL TECHNOLOGIES.**

The first step in a "Top-Down" analysis is to identify, for the emission unit in question, "all available" control options. Available control options are those air pollution control technologies or techniques with a PRACTICAL POTENTIAL FOR APPLICATION to the emissions unit and the regulated pollutant under review. This includes technologies employed outside of the United States. Air pollution control technologies and techniques include the application of production processes or available methods, systems, and techniques, including fuel cleaning or treatment or innovative fuel combustion techniques for control of the affected pollutant.

STEP 2: **ELIMINATE TECHNICALLY INFEASIBLE OPTIONS.**

The technical feasibility of the control options identified in Step 1 is evaluated with respect to the source-specific (or emissions unit specific) factors. In general, a demonstration of technical infeasibility should be clearly documented and should show, based on physical, chemical, and engineering principles, that difficulties would preclude the successful use of the control option on the emissions unit under review. Technically infeasible control options are then eliminated from further consideration in the BACT analysis.

STEP 3: **RANK REMAINING CONTROL TECHNOLOGIES BY CONTROL EFFECTIVENESS.**

All remaining control alternatives not eliminated in Step 2 are ranked and then listed in order of over-all control effectiveness for the pollutant under review, with the most effective control alternative at the top. A list should be prepared for each pollutant and for each emissions unit subject to a BACT analysis. The list should present the array of control technology alternatives and should include the following types of information:

1) control efficiencies;
2) expected emission rate;
3) expected emission reduction;
4) environmental impacts;
5) energy impacts; and
6) economic impacts.

STEP 4: **EVALUATE MOST EFFECTIVE CONTROLS AND DOCUMENT RESULTS.**

The applicant presents the analysis of the associated impacts of the control option in the listing. For each option, the applicant is responsible for presenting an objective evaluation of each impact. Both beneficial and adverse impacts should be discussed and,

where possible, quantified. In general, the BACT analysis should focus on the direct impact of the control alternative. The applicant proceeds to consider whether impacts of unregulated air pollutants or impacts in other media would justify selection of an alternative control option. In the event the top candidate is shown to be inappropriate, due to energy, environmental, or economic impacts, the rationale for this finding should be fully documented for the public record. Then the next most stringent alternative in the listing becomes the new control candidate and is similarly evaluated. This process continues until the technology cannot be eliminated.

STEP 5: **SELECT BACT.**

The most effective control option not eliminated in Step 4 is proposed as BACT for the emission unit to control the pollutant under review.

Attachment B
KANSAS DEPARTMENT OF HEALTH AND ENVIRONMENT'S EVALUATION OF WESTAR ENERGY JEFFREY ENERGY CENTER PROPOSED BACT OPTIONS

Westar Energy evaluated the BACT analysis to control emissions from the NOx Reduction Project. The only significant emission increase from this project is carbon monoxide (CO).

CO BACT for the NOx Reduction Project

Carbon Monoxide (CO) controls consist of good combustion practices or oxidation catalyst. Good combustion practices can insure baseload limits of 300 ppm for combustion subituminous coal. Catalytic oxidation is capable of reducing CO emissions by 90 percent in a coal fired boiler.

The PSD regulations require BACT, which requires the source to evaluate the control options for technical feasibility. Since the boiler's exhaust temperature will be approximately 300 to 350 degrees Fahrenheit, and catalytic oxidation requires temperature above 500 Degrees Fahrenheit, the use of a CO catalytic oxidation is determined technically infeasible.

Based on the technical constraints, the use of good combustion practices to meet a baseload emission levels of 300 ppm is proposed by Westar Energy as BACT.

Carbon monoxide is formed as a result of incomplete oxidation of carbon in the fuel. The concern is that by minimizing CO formation, NOx emissions are inversely increased. A catalytic oxidizer could be used to minimize CO emissions. However, in the case of coal-fired boilers, the exhaust temperature is generally below the operation range for the oxidation catalyst. The exhaust temperature in the application will be approximately 300^{o}F to 350^{o}F, but oxidation catalysts require temperatures above 500^{o}F in order to effectively reduce emissions. Therefore, catalytic oxidation is determined technically infeasible for this case.